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10/069,009	02/20/2002	Mitsuru Uesugi	L9289.02118	4532

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STEVENS DAVIS MILLER & MOSHER, LLP
1615 L STREET, NW
SUITE 850
WASHINGTON, DC 20036

EXAMINER	
AGHDAM, FRESHTEH N	
ART UNIT	**PAPER NUMBER**
2611	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/069,009	Applicant(s) UESUGI ET AL.
	Examiner Freshteh N. Aghdam	Art Unit 2611

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *26 January 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *14-22 and 25-27* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *14-22 and 25-27* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments, see pages 8-9, filed 1/26/2006, with respect to the rejection(s) of claim(s) 13-24 under the instant application's disclosed prior art, Lee et al (6,259,744), and Sugiyama et al (US 5,862,175) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of the instant application's disclosed prior art, Hostetter (US 4,866,395), Lee et al (6,259,744), and Sugiyama et al (US 5,862,175).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 25 and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Uesugi et al (EP 1 011 245), and further in view of the instant application's disclosed prior art.

As to claims 25 and 26, the instant application's disclosed prior art teaches an adaptive modulation communications system comprising a determiner that determines a modulation level for modulating transmission data (Fig. 1, means 1-2; page 2, lines 1-3);

an adder that adds an error detecting bit to the transmission data per predetermined error detecting unit in the transmission data (Fig. 1, means 3; page 2, lines 10-12); transmitting the modulated data to a receiver (Fig. 1, means 9 and 12); and the receiving apparatus comprises a receiver that receives the transmission unit (Fig. 1, means 12); a demodulator that demodulates the error detecting units in the transmission unit using different demodulation patterns respectively (Fig. 1, means 14-1 and 14-2; page 3, lines 14-25), wherein the demodulator uses demodulation patterns that apply to a modulation scheme of a modulation level determined by the determiner (Fig. 1, means 14-1 and 14-2; page 3, lines 14-25; page 4, lines 1-9); and an error detecting unit coupled to the demodulator (Fig. 1, means 16). The instant application's disclosed prior art does not expressly teach that a modulator that modulates a transmission data with a number of error detecting units in accordance with the modulation level by a modulation scheme corresponding to the modulation level so that a bit position is specific to each of the error detecting units; a plurality of demodulators that demodulate the signal based on regions of demodulation patterns to which signal points of bits belong using the demodulation patterns different between the error detecting units respectively. One of ordinary skill in the art would clearly recognize that transmitting a number of error detecting units (i.e. bits) in accordance with the modulation level and error detecting on the demodulated signal to obtain the transmitted signal is known as Cyclic Redundancy Check (i.e. CRC) coding and is well known in the art and it is performed in order to enhance error reduction and signal estimation in the communications system. Uesugi teaches a plurality of demodulators that demodulate

the signal based on regions of demodulation patterns to which signal points of bits belong using the demodulation patterns different between the error detecting units respectively to obtain the transmitted data (Fig. 5B, means 153 and 154; Fig. 10B, means 153, 751-753). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Uesugi with the instant application's disclosed prior art in order to adaptively control a data transmission rate to improve transmission efficiency of data (Abstract).

Claims 21-22 and 25-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshida et al (EP 0 944 200), and further in view of the instant application's disclosed prior art.

As to claims 25 and 26-27, the instant application's disclosed prior art teaches an adaptive modulation communications system comprising a determiner that determines a modulation level for modulating transmission data (Fig. 1, means 1-2; page 2, lines 1-3); an adder that adds an error detecting bit to the transmission data per predetermined error detecting unit in the transmission data (Fig. 1, means 3; page 2, lines 10-12); transmitting the modulated data to a receiver (Fig. 1, means 9 and 12); and the receiving apparatus comprises a receiver that receives the transmission unit (Fig. 1, means 12); a demodulator that demodulates the error detecting units in the transmission unit using different demodulation patterns respectively (Fig. 1, means 14-1 and 14-2; page 3, lines 14-25), wherein the demodulator uses demodulation patterns that apply to a modulation scheme of a modulation level determined by the determiner (Fig. 1, means 14-1 and 14-2; page 3, lines 14-25; page 4, lines 1-9); and an error

detecting unit coupled to the demodulator (Fig. 1, means 16). The instant application's disclosed prior art does not expressly teach that a modulator that modulates a transmission data with a number of error detecting units in accordance with the modulation level by a modulation scheme corresponding to the modulation level so that a bit position is specific to each of the error detecting units; a plurality of demodulators that demodulate the signal based on regions of demodulation patterns to which signal points of bits belong using the demodulation patterns different between the error detecting units respectively. One of ordinary skill in the art would clearly recognize that transmitting a number of error detecting units (i.e. bits) in accordance with the modulation level and error detecting on the demodulated signal for each of the error detecting units to obtain the transmitted signal is known as Cyclic Redundancy Check (i.e. CRC) coding and is well known in the art and it is performed in order to enhance error reduction and signal estimation in the communications system. Yoshida teaches a plurality of demodulators that demodulate the signal based on regions of demodulation patterns to which signal points of bits belong (Fig. 9, means 206-209; Par. 96). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Yoshida with the instant application's disclosed prior art in order to perform adaptive modulation in a communications system for which any of a modulation level s can possibly be selected is adapted (Par. 93).

As to claim 21, the instant application's disclosed prior art teaches a detector (Fig. 1, means 16) that performs error detection of a demodulation result in the demodulator per error detectin unit; and a repeat requester (Fig. 1, repeat request

signal) that sends a repeat request to the transmitting apparatus according to an error detecting result (Fig. 1, means 16) per error detecting unit (page 3, lines 14-page 4, lines 1-20).

As to claim 22, the instant application's disclosed prior art teaches the determiner determines the modulation level based on channel quality estimated from the repeat request signal (Fig. 1, means 1-2, 5,-6, and 11; page 4, lines 18-page 5, line10).

Claims 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the instant application's disclosed prior art and Yoshida, further in view of Sugiyama et al (US 5,862,175).

As to claim 14, the instant application's disclosed prior art teaches that the determiner determines the modulation level (Fig. 1, means 1-2). The instant application's disclosed prior art and Yoshida are silent about the modulation level uses a number having an integer square root. Sugiyama, in the same field of endeavor, teaches a modulation communications system that the modulation scheme is varied among M-ary modulation schemes (n phase shift keying modulation schemes) each with a square root of the number of signal points being an integer (Fig. 1, 2^n multi-level modulation means; Col. 3, lines 5-9). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Sugiyama with the instant application's disclosed prior art and Yoshida in which selectable and flexible modulation of variable order can be performed.

As to claim 15, the instant application's disclosed prior art teaches that the determiner determines the modulation level (Fig. 1, means 1-2). The instant application's disclosed prior art and Yoshida are silent about the modulation level uses a number not having an integer square root. Sugiyama, in the same field of endeavor, teaches a modulation communications system that the modulation scheme is varied among M-ary modulation schemes (n phase shift keying modulation schemes) each with a square root of the number of signal points not being an integer (Fig. 1, 2^n multi-level modulation means; Col. 3, lines 5-9). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Sugiyama with the instant application's disclosed prior art and Yoshida in which selectable and flexible modulation of variable order can be performed.

Claims 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over the instant application's disclosed prior art and Yoshida, further in view of Lee et al (US 6,259,744).

As to claim 16, the instant application's disclosed prior art teaches that the transmitting apparatus comprises a modulator (Fig. 1, means 6-1 and 6-2) that modulates the transmission data at a modulation level determined by the determiner (Fig. 1, means 1, 2, 6-1, and 6-2). The instant application's disclosed prior art and Yoshida are silent about the modulator modulates the transmission data by arranging signal points in such a way that a difference between the number of signal points on the I-axis and Q-axis is small. Lee, in the same field of endeavor, teaches a signal space

diagram wherein the number of signal points on the I-axis is the same as the number of signal points on the Q-axis (Fig. 3). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Lee with the instant application's disclosed prior art and Yoshida in order to minimize header decoded BER (i.e. bit error rate) over many channel conditions (Col. 2, Lines 17-19).

As to claims 17 and 18, the instant application's disclosed prior art teaches that the transmitting apparatus comprises a modulator (Fig. 1, means 6-1 and 6-2) that modulates the transmission data at a modulation level determined by the determiner (Fig. 1, means 1, 2, 6-1, and 6-2). The instant application's disclosed prior art is silent about using a modulation scheme in which a phase direction is identified by an axis that crosses an origin point in a signal space diagram. Lee, in the same field of endeavor, teaches using phase determination axes (Fig. 3, means 54 and 56; Col. 5, Lines 1-12 and 51-53) passing through the origin point in a signal space diagram and computing the closest distance between the symbol and the bit on the decision line (i.e. amplitude identification). Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Lee et al with the instant application's disclosed prior art and Yoshida in order to detect error probability of a bit in a symbol (Col. 5, Lines 7 and 8).

As to claim 19, the instant application's disclosed prior art teaches the adder (Fig. 1, means 3) adds the error detecting bit (page 2, lines 10-12); the receiving apparatus further comprises a detector that performs error detection (Fig. 1, means 16) of each demodulation result (Fig. 1, means 14) in the demodulator using the error detection bit; and the detector outputs a bit without an error as an effective bit transmitted from the

transmitting apparatus (Fig. 1, means 16). The instant application's disclosed prior art and Yoshida are silent about the error detection unit performs error detection every plurality of bits collectively. One of ordinary skill in the art would clearly recognize that error detecting bit addition every plurality of bits collectively is well known in the art (Cyclic Redundancy Check or CRC) and it is performed in order to enhance error reduction in the communications system.

As to claim 20, the instant application's disclosed prior art and Yoshida teach all the subject matter claimed above, except for the transmitter transmits a pilot signal (training sequence or the second bit decision line) arranged in the middle of a maximum amplitude in a signal space diagram of the modulation scheme. Lee teaches the pilot signal (Fig. 3, decision lines 54 and 56) is arranged in the middle of a maximum amplitude in a signal space diagram of the modulation scheme (column 5, lines 1-10 and 30-32; column 6, lines 47-50). One of ordinary skill in the art would clearly recognize that transmitting pilot signal from a transmitter to a receiver is well known in the art and it is performed for performance characteristic measurements and synchronization. Therefore, it would have been obvious to one of ordinary skill in the art to combine the teaching of Lee with the instant application's disclosed prior art and Yoshida in order to greatly improve the reliability of fields that carry the preferred information (column 2, lines 58-60).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Golitscheck Edler Von Elbwart et al (US 2003/0166395) see figures 1-4 and 6-7.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Freshteh N. Aghdam whose telephone number is (571) 272-6037. The examiner can normally be reached on Monday through Friday 9:00-5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Freshteh Aghdam
April 17, 2006

KEVIN BURD
PRIMARY EXAMINER